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THE FEEDING HABITS OF THE BLACK SKIMMER.

BY STANLEY CLISBY ARTHUR.

Plates XX and XXI.

To those who have studied the sea birds no species is of more interest than the Black Skimmer (*Rynchops nigra*) principally because of the unique formation of its bill, in which the maxilla is not only capable of excessive vertical movement but is a great deal shorter than the lower mandible. With such a difference in the length of the two parts of the bill it is quite beyond contradiction that this inch and a half of excessive growth denotes some highly specialized function.

Just what is this function?

Thomas Pennant, who in 1781 gave the bird its present common name, wrote: "I call it Skimmer from the manner of its collecting its food with the lower mandible as it flies along the surface of the water."¹

This British naturalist was probably among the first to give voice in ornithological literature to the commonly accepted version that the Black Skimmer so secures its food. As Mark Catesby had already figured and described the bird (which he called a "Cut-water") it is quite possible that Pennant attributed functions of feeding from hearsay evidence and not from personal observations.

Charles Darwin said of a flock of "Scissor-beaks" he saw flying over a lake in Argentina: "I saw several of these birds, generally in small flocks, flying rapidly backwards and forwards close to the surface of the lake. They kept their bills wide open, and the lower mandible half buried in the water. Thus skimming the surface, they ploughed it in their course . . . and dexterously manage with their projecting lower mandible to plough up small fish, which are secured by the upper and shorter half of their scissor-like bills."²

¹ Gen. of Birds, p. 52.

² Voyage of the Beagle, Ch. VII.

Skimmers, according to Audubon: "spend the whole night on the wing, searching diligently for food. . . . I have seen a few of these birds glide in this manner in search of prey over a long salt-marsh bayou or inlet, following the whole of its sinuosities, now and then lower themselves to the water, pass their bill along the surface and, on seizing a prawn or small fish, instantly rise, munch and swallow it on the wing."¹

Alexander Wilson goes rather into detail in regard to the feeding habits of this bird which he calls a "Shearwater" and his observations are most interesting: "The Shearwater is formed for skimming, while on the wing, the surface of the sea for its food, which consists of small fish, shrimps, young fry, etc., whose usual haunts are near the shore and towards the surface. That the lower mandible, when dipt into and cleaving the water, might not retard the bird's way, it is thinned and sharpened like the blade of a knife; the upper mandible being at such times elevated above the water is curtailed in its length as being less necessary, but tapering gradually to a point, that, on shutting, it may offer less opposition. To prevent inconvenience from the rushing of the water, the mouth is confined to the mere opening of the gullet which, indeed, prevents mastication taking place there; but the stomach, or gizzard, to which this business is solely allotted is of uncommon hardness, strength and muscularity, far surpassing in these respects any other water bird with which I am acquainted.

"Whoever has attentively examined this curious apparatus and observed the possessor, with his ample wings, long bending neck and lower mandible, occasionally dipt into and ploughing the surface and the facility with which he procures his food, cannot but consider it a mere playful amusement, when compared with the dashing immersions of the Tern, the Gull, or the Fish-hawk, who, to the superficial observer, appear so superiorly accommodated. . . . On examining the stomachs of several of these, shot at the time, they contained numbers of small fish usually called *silver-sides*."²

¹ Ornith. Biog. IV, pp. 204-206.

² Am. Ornith., Vol 7, pp. 90-91.

The Rev. J. G. Wood, widely read because of the lavishness of the woodcuts in his works, in his text on the Skimmer quotes Rene P. Lesson, (noted for a number of his ornithological blunders) when describing the bird's feeding habits: "It [the Skimmer] does not, however, trust solely to the wide seas for its food for according to Lesson, who was an eyewitness to the scene, the bird feeds on bivalves, adroitly inserting its beak into their shells as they lie open and then banging the shell against a rock or stone so as to break the hinge and expose the inhabitant which is immediately scooped up and swallowed."¹

The careful Coues in describing the Skimmer's feeding habits is not so positive as some other writers as to the function of the elongated bill, but does help in furthering Lesson's preposterous observation that the bird pries open oysters and other bivalves with its thin and weak bill.

"They seem to feed," he says, "as they skim low over the water, with the foreparts inclined downward, the under mandible probably grazing or cutting the surface; but they are said to use their odd bill to pry open weak bivalve mollusks."²

The popular bird literature of today differs but little in describing the feeding habits of the Skimmer. Says Chapman: "Skimmers are unique both in the form of the bill and in their manner of feeding. Opening the mouth, the blade-like lower mandible is dropped just beneath the surface of the water; then, flying rapidly, they may be said to literally 'plow the main' in search of their food of small aquatic animals."³

Reed, in his popular work, claims: "They fly in compact flocks, in long sweeps over the water, feeding by dropping their long, thin mandibles beneath the surface and gathering in everything edible that comes in their path."⁴

Hornaday has this to say of the Skimmer's feeding habits: "When seeking food the Skimmer looks for calm water, and then, with most dexterous and well-balanced flight, it slowly wings its

¹ Nat. Hist. Birds, p. 753.

² Key to N. A. Birds, p. 1019.

³ Handbook Birds N. E. America, p. 172.

⁴ Bird Guide, Water Birds, p. 56.

way close down to the surface, so low that the lower mandible is actually held *in the water* while the bird is in full flight. Any small object that happens to lie on the surface is shot into the mouth, through what is really a very small opening.”¹

F. H. Knowlton, in his ‘Birds of the World,’ says the Skimmer’s peculiar bill is an obvious adaptation for securing food: “They do not dive for their food as do the Terns, nor do they pick it up while swimming, for they rarely sit upon the water; but they obtain it by skimming rapidly over the surface with the lower mandible dipped into and cleaving the surface, thus scooping it up much after the manner of whales. The thinning of the lower mandible is clearly for the purpose of reducing the friction in passing through the water, while the upper one is shortened and has become movable to keep it out of the way. The Indian Skimmer (*R. albigollis*) according to Mr. Blanford, is usually seen on broad and smooth rivers down to the tideway, not in torrents nor, so far as known, on the sea. They are usually found in the morning and evening flying, often in scattered flocks, rather slowly close to the water, now and then dipping their bills in the stream. They occasionally catch fish, but he doubts if it is their general custom, and asserts that the use of the bill is still unknown, a statement in direct conflict with that of his distinguished countryman.” (Darwin quoted also as above.)²

What I have to here advance, as a contribution to the feeding habits of a bird that I have closely and carefully observed and studied for the past seven years, is in the nature of a respectful contradiction to the statements quoted above. My observations fall into two classes, viz:

1. I have *never* seen a Skimmer secure its fish food *while skimming the waters with its under mandible immersed*, as set forth by Pennant and those who have written of this bird since his time.

2. I *have* seen the Black Skimmer secure its food and collect the fish in an entirely different manner from the generally attributed mode.

¹ Am. Nat. Hist., Vol. III, p. 257.

² Birds of the World, p. 394.

Louisiana offers exceptional opportunities for the study of the gulls, terns, Skimmers and other waterbirds. Up to 1915, from what I had gleaned from text books and general bird literature, I held the belief that the Skimmer procured its food as previously described but when exploring the Louisiana bird breeding islands with Theodore Roosevelt a remark by him set me studying this particular species with more than the cursory interest I had previously bestowed upon it.

As a result of this study, after the observance of thousands of Skimmers, at rest and in flight; in summer, when the necessity of feeding young called for incessant fishing upon the part of the adults, and in the fall when the birds were either fishing in pairs or on solitary excursions, I am forced to doubt that the Skimmer secures its sustenance in the orthodox manner, and am prepared to prove that it procures its food, or at least a part of it, by an entirely different method.

Every trip of inspection that brought me in contact with the Skimmer subsequent to my discussion with Col. Roosevelt as to the reason for the unequal lengths of this bird's bill, I kept close watch on every flying and "skimming" member of this family seen. From the deck of the conservation patrol boats, on which I made most of my trips over the Louisiana waters, aided by the magnified vision binoculars gave me, I have had exceptional opportunities for studying the Skimmer. On not one occasion out of the thousands of birds noted did I once behold one secure, or make any movement of the bills that would suggest that it had so secured food, while in flight. The years 1915, 1916, 1917, 1918 were without results that would tend to prove the bird secured its food in any *other* manner than the method set forth by most writers.

In 1918, while making a survey of the food habits of the Brown Pelican for the United States Food Administration's benefit, I was working from a blind on East Tambalier Island to secure motion and other photographs of a flock of Brown and White Pelicans on a shell reef. While waiting for the White Pelicans to join the Brown, I noted a commotion to the left of my blind—a wild bird chorus made by Black Skimmers and a few Laughing

Gulls. A school of small fish had been chased into a shallow flat, evidently by larger fish, and the birds were soon busy securing food.

A wheeling flock of Skimmers "skimmed" the surface of the lagoon, and then settled into the water, which was scarcely more than three inches deep, and immediately commenced to pick up fish while the birds were in a standing position. As fast as a Skimmer would secure what fish it needed in this manner, it would fly off, without doubt to its nestlings, and others would come splashing into the water, and, standing erect, would secure the fish with straight downward motions of the mandibles. While a number of arriving birds would "skim" the surface of the shallow flat before alighting at no time was there any ocular evidences of fish being picked up and, owing to my close and concealed position, had the birds so secured fish that were most plentiful I would have certainly seen such an act.

The photographs herewith submitted were made at the time and the birds can be seen in the different attitudes assumed while picking fish out of the water. Owing to the position of my blind and the tidal flat it was necessary to make the photographic exposures against the sun which accounts for the slight haziness of the pictures but they are sufficiently distinct to show the variety of attitudes assumed while the birds were actually fishing. This was the first observation made of the feeding habits of the Skimmers. Subsequently I made others, altho I was never near enough to distinctly photograph the Skimmers in the act of so securing their food, but the methods afterwards observed were absolutely identical with those first seen.

The habit of skimming with the mandibles immersed is most noticeable with Skimmers when their nesting grounds are invaded. Alarmed at one's appearance, the birds take to the air and circle about with their characteristic *yap, yap, yap, yap, yapping*. When they pass over the water certain individuals of the flock will skim close to the water, "cutting the surface" with their bills. At this time they are in a highly excited and alarmed state and are not "intent on gathering up everything edible that comes in their path!" Indeed, they are most apprehensive as to what man is

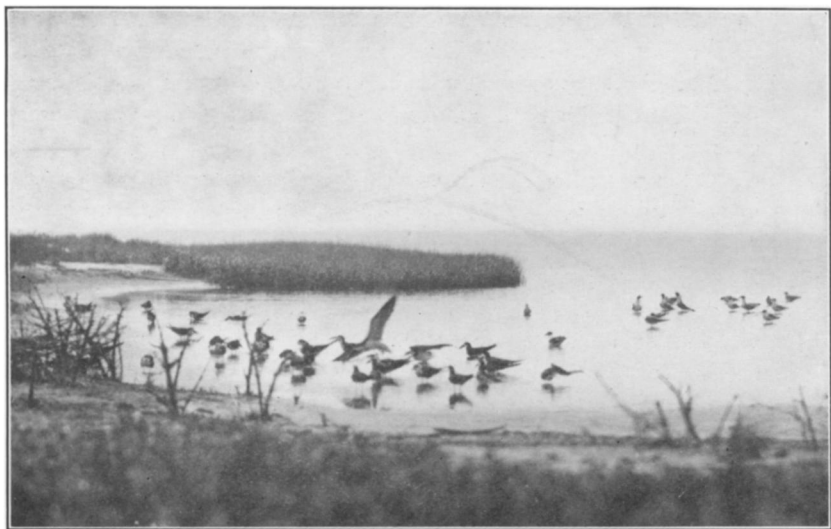
going to do to their eggs and young. Why, then, if this skimming the waters with the mandibles is a highly specialized feeding function, should they at this time adopt their so-called fishing mode of flight?

According to Wm. T. Blanford's observations of the Indian Skimmer this bird only "*occasionally catches fish*" while skimming and he doubts if it is their general custom to so secure food, and asserts that the actual use of the peculiar bill is still unknown. I cannot but feel that this is equally true of *Rynchops nigra*. In the case of the actual capturing of prey that I have observed I note that the Skimmer always fishes in very shallow water and while in a standing position. The act of seizing prey is done by straight downward motions of the head and neck, something akin to the chopping movement of an axe. The fish are seized and held at right angles to the bird's bill before swallowing, and the movements necessary to secure the fish are rather slow and deliberate. When seized and held the Skimmers do not show any marked ability to "deftly swallow their prey," as a matter of fact, the act of swallowing is rather labored and accompanied by a great deal of shaking of the mandibles to place the fish in the proper "head foremost" position to insure unobstructed passage to the crop. "Skimming" birds joining the feeding birds perform the "cut water" trick with *both* mandibles closed tight before alighting and commencing feeding in the manner just set forth.

I therefore count it more than merely strange that with the opportunities that I have had to observe the act, I have yet to see a Skimmer secure its fish food by the skimming method set down in ornithological literature by veteran and abler observers.¹

When carrying fish to their young the parent birds carry the whole fish crosswise in their mandibles. This I have observed on hundreds of occasions. Examinations of the food show that the Skimmers, at least in Louisiana, feed *exclusively* on small fish, and of a great variety of species. I have found they feed upon,

¹ Cf. General Notes beyond. Ed.



BLACK SKIMMERS (*RYNCHOPS NIGRA*).

1. Bird in center cleaving water with one mandible, not feeding.
2. Feeding on Fish on a Tidal Flat.

the following species arranged in the order of their numerical importance: *Cynoscion nothus*, *Atherina* sp. (Siversides, note Wilson's observation), *Mugil cephalus*, *Scomberomorus maculatus*, *Pomatomus saltatrix*, *Cynoscion nebulosus*, *Sciaenops ocellatus*, *Trachinotus carolinus*, *Carangus hippos*, and others unidentified.

The majority of these fish were secured on the breeding grounds being the food carried to feed the young. The largest fish fed to the young that I was able to secure was 73 mm. in length, but fish this size are only fed to young with feathers. The Black Skimmers have two ways of feeding their young. The downy young are fed by regurgitation, the food being dropped on the ground by the parent bird, but so avid are the little ones for food that they pick at the parent bird's bill as the fish is being dropped, they then pick it up as a tiny chick would take up moistened bread. When the nestlings commence to show feathers they are fed entire fish. The adults fly in from their fishing grounds with the food carried cross-wise in the mandibles and it is given direct to the young bird which invariably secures it head-first. If, by chance, the fish is first dropped to the ground the nestling will secure it by turning its head and bill side-wise. This is not a difficult task and at this time there does not seem to be any physical reason for so doing as at this period the difference in length between the upper and lower mandibles is slight but, to me, indicates a precocity that will prove useful in the adult stage. When Skimmers are first hatched the bills are of equal length and it is not until the young are some weeks old that the curious formation of the lower mandible begins to show by slightly exceeding the upper one in growth.

Attentive observation of the young in various stages was barren of results in a search for a reason for the unusual and unequal growth of the Skimmer's mandibles. The answer lies wholly with the adult bird.

Audubon's assertion that Skimmers "spend the whole night on the wing, searching diligently for food" is not borne out by my observations. While a few of the birds are heard at night I would not say that they are nocturnal but that they are, to a marked

degree, crepuscular. During the reproduction period their fishing habits must be diurnal, especially if young are to be fed.

The insistence of most writers that the skimming is done "with the *under* mandible immersed" does not agree with my observations. The skimming and "plowing the main" is usually done with the mandibles closed save for the times they are opened to permit the cry or "bark." This I can show by photographs of the birds in the act of cleaving the surface of the water. In my collection of photographs I have but one showing the bird cutting the water with its lower mandible only and this bird was "yapping" loudly when so flying over the surface.

My conclusions are that the Black Skimmer does not secure its food in the way generally set forth and that the function of the unique inequality of the mandibles is as yet unknown.

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EXPLANATION OF PLATES.

Plate XX, fig. 1. Black Skimmer cleaving the water with its lower mandible only. This bird was excited and apprehensive over my nearness to its nest of eggs and was not fishing. It was emitting its characteristic "yap, yap, yap" while circling me and when it would pass the tidal flat would lower itself to the surface of the water and cut it with its bill.

Plate XX, fig. 2. Skimmers feeding on a school of fish in a tidal flat. The different attitudes adopted while securing fish can be seen by close inspection. The two birds in the upper left can be observed in the act of catching their prey. One is making straight downward plunges of its mandibles while the other is belly deep in the water having a tussle with the bastard weakfish it has caught (the school consisted of *Cynoscion nothus*). One Skimmer can be observed in the act of alighting in the water to fish in preference to securing food by "skimming" which, in this case, would have been an easy matter if this were its mode of fishing.

Plate XXI, fig. 1. The same flock fishing in the same flat. Note one bird joining the others by skimming over the water with both mandibles closed. After alighting it fished as did the others—standing in the water.

Plate XXI, fig. 2. Skimmers in flight over the water and cleaving it. Note that the two lower birds are cutting the water with the mandibles closed.



BLACK SKIMMERS (*RYNCHOPS NIGRA*).

1. Fishing on a Tidal Flat.
2. In Flight over the Water.